The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Manufacture of Industrial Gases

INDUSTRIAL gases can be used as finished products for a variety of purposes or they can be the raw material for other industrial processes. Thus the constituents of air are put to a variety of uses and the same gas may serve many purposes, sometimes as primary product and sometimes as raw material. Oxygen is used for cutting and welding, nitrogen for fertilisers and explosives, argon for incandescent bulbs, and neon for discharge tubes. Shortly before the war krypton and xenon, present in air in a concentration of one in a million, were being used for lamps, and the only reason why helium was not being separated from air was that it could be obtained more cheaply from other sources. It is important to realise that all these developments have taken place in the present century, mainly as the result of Linde's invention of a machine for producing liquid air on a commercial scale. There are many industrial processes, such as the production of iron in the blast furnace and the production of producer gas, which would be considerably improved if really cheap oxygen could be obtained. Producer gas as now manufactured contains some 50-55 per cent. of nitrogen. If it could be made with pure oxygen a greater amount of steam could be used and the H_2:CO ratio so varied that the gases produced would be utilisable for the production of organic chemical compounds with far greater facility than under present conditions.

Dr. Martin Ruhemann, in a paper read before the Institution of Chemical Engineers and allied associations, gave it as his opinion that the time is not far distant when the economic utilisation of the world's gas resources will become an urgent problem. The quantities of hydrogen, carbon monoxide, and olefines required for chemical processes will be so great that we shall no longer be in a position to squander these gases by firing them together with any other constituents that may occur in mixtures. Then the separation of gases will become the rule instead of the exception. Already, in the "rich air" industry, which produces impure oxygen for blast furnaces, the Linde-Fränkl system has for some time employed expansion turbines at temperatures close to atmospheric and pressures of about 3 atm. abs. as an auxiliary source of cooling. The use of turbines as primary sources of refrigeration for air at low temperatures has been

On Other Pages

delayed through technical difficulties. This problem was solved quite recently by Kapitza in Moscow, who designed an expansion turbine working from 7 atm. at very low temperatures, taking into account the fact that under these conditions, air is about midway between a gas and a liquid in the usual sense. It appears that Kapitza's machine can produce cheaper " rich air " than the Linde-Fränkl plant. It was intended mainly to supply impure oxygen for the underground gasification of coal and will, incidentally, yield large quantities of krypton and xenon for filling incandescent bulbs. The change-over from argon to a krypton-xenon mixture in bulbs has been calculated to save several million kWh per annum.

In the production of hydrogen, as an example, many processes are possible. The water gas reaction can be used, the CO being converted into CO_2 which is removed. The iron-steam reaction has been frequently employed for the purpose. Hydrocarbons have been decomposed by heat with the production both of hydrogen and of carbon black. Or the hydrogen content in industrial gases can be isolated by well-known methods of liquefaction. It appears from Dr. Ruhemann's paper that chemical methods of gas production are likely to be superseded by methods based on cooling wherever the gases required are contained in industrial mixtures. Up to the present, air, cracker gas from the petroleum industry, and coke-oven gas seem to be the gaseous mixtures to which principal attention has been directed. A great deal of the work has been done in Russia, where whole towns are said to be employed basically on the liquefaction of gases. Separating the constituents of coke-oven gas seems to be more difficult than the same operation with air, but Dr. Ruhemann states that the scientific data required for the full development of coke-oven gas separation are available. The path is free for an extension of the process to the production of other fractions and components apart from a mixture of hydrogen and nitrogen and for the separation of other gases of somewhat different composition, but containing essentially the same components in different proportions. Valuable data have also been obtained for the elaboration of a theory of the liquid state and for the thermodynamics of mixtures and solutions.

The inclination seems to be towards larger units and the greater use of cold liquids. The pressing problems of fuel economy and the need for raw materials for chemical synthesis on a large scale will necessitate developments in the production of pure gases, and there is a marked tendency to get away from the chance composition of gaseous mixtures and instead to produce from them pure or almost pure gases and to make up mixtures of a definite composition suitable for chemical processes, *e.g.*, the production of methanol, or of oil by the Fischer-Tropsch process. The power required for gaseous separation depends largely upon the scale of the operations. As long as the plant is small and the products are withdrawn at room temperature, power remains a small factor in production costs. With large plant, which cheapens the labour factor, and the added cost of refrigeration for yielding cold liquids, power becomes the predominant factor.

NOTES AND COMMENTS

Synthetic Nitrogen

MUCH the same state of affairs as is indicated above obtains in the synthetic nitrogen industry, the ultimate choice of processes depending largely on the source of power available. In this country we have no cheap natural water power that can be used to produce a great gas separation industry. If we wish to take part in this development it is thus necessary for us to give special attention to the development of an industrial technique which will reduce power costs to a minimum. Dr. Ruhemann sees the importance of this and he believes that in proportion as power becomes the predominant factor new methods of refrigeration will be devised, and he believes that a further development of the absorption method and the general use of mixed refrigerants are likely to be prominent features of the newer technique.

Raw Materials for Chemistry

ONE of the many useful peace-time activities of the London and South Eastern Counties Section of the Institute of Chemistry has been organised visits to works where operations of interest to members are in progress. An interesting war-time innovation was, however, made recently when a party of 50 members visited the galleries of the Imperial Institute at South Kensington to inspect exhibits of Empire raw materials. The exhibits, in addition to showing the raw products and the conditions under which they are produced, in many cases also contain " story " exhibits which trace the course of many products from raw material to manufactured article. Sir Harry Lindsay, K.C.I.E., C.B.E., Director of the Imperial Institute, referred to the work of the chemical and mineralogical laboratories where analyses and small-scale technical trials were carried out on new or little-known raw materials of Empire origin.

Alternative Sources

SIR HARRY stressed the necessity for chemists to become familiar not only with alternative Empire sources of supply of their raw materials, but also of the by-products therefrom and possible substitutes, and drew attention to cases where the waste produce of one decade had become of primary importance in the next. He instanced the case of ilmenite from Travancore which for years was a waste product in the recovery of monazite from beach sands, but later, owing to the increasing use of titanium white paint, became the primary mineral yielded by the deposits which had exported up to 250,000 tons per annum. In addition, other important minerals such as rutile, zircon and sillimanite were now also obtained as by-products. Sir Harry also referred to the recent American work which seems to have demonstrated that an admirable plastic moulding powder can be produced from bagasse, the fibrous residue of the sugar-cane left after the sugar has been extracted, and said that it had even been suggested in the United States that in time sugar itself may become simply a by-product of a new plastics industry. The manufacture of the new plastic, cafelite, in Brazil from the coffee bean is another example of how the work of the chemist is altering the outlook on some of the major crop products of the world.

Chemists and Physicists

IN a memorandum on post-war education and the training of physicists, prepared for the Institute of Physics by H. Lowery, M.Ed., D.Sc., F.Inst.P., the writer states that, in view of the widespread applications of physics in the modern world, it is necessary to broaden somewhat the range of workers who shall be denominated " physicists." " In this connection," he says, " I would go to the extent of saying that certain chemists and engineers, for example, have had their energies diverted so far into the study of physical problems that they have virtually become physicists." After referring to a recent address of the president of the Institute in which he pointed out that in the years immediately preceding the war the universities were turning out approximately one good physicist per million of the population per year, Dr. Lowery states his belief that industry needs many more than than this. At a certain stage in the development of new ideas for large-scale production in the factories usually demanding a faculty of perseverance in the individual, there seemed, he said, to be a particular shortage, and it was there that engineers, chemists and even biologists were found to be doing the work of trained physicists.

Town and Country Factories

IT seems probable, according to the recently-published report of the Committee on Land Utilisation in Rural Areas, that a limited number of war-time factories, not only those devoted to heavy industries, but also others now widely scattered in rural areas, will become the nuclei of new industrial areas. The committee notes that that the heavy industries, and most immobile industries, are organised in large units, and where they do go into country places they give rise to new industrial areas of considerable size whether measured in population or area. As an instance of this tendency, the committee points to the growth of the heavy chemical industry of Billingham during the last twenty-five years. The committee is not satisfied that all fac-

tories built up in rural areas during the war should remain, and suggested that those which are unsuitably situated relative to national interests as a whole should be eliminated after the war. Some factories certainly will be closed down because of the lack of peace-time demand for their products. The question of where those that remain shall be situated must involve considerations which appear to be beyond the terms of reference of the committee. The whole economic order of the country—both in town and rural areas—is now irrevocably bound up with the redistribution of industry which is a still-growing feature of war production.

Chemist Joins Ministry Staff

THE Government has long been criticised for not making full use of the scientific brains of the country in the war effort. The Minister of Production has, however, now taken an important step towards seeing that full use is made in the future of our scientific and technical resources in the field of production by appointing to his staff several full-time Scientific Advisers. Dr. I. M. Heilbron, Professor of Organic Chemistry, Imperial College of Science and Technology, is one of the new members. The others are Mr. W. A. Stanier, chief mechanical engineer of the London Midland and Scottish Railway; and Dr. T. R. Merton, treasurer of the Royal Society. In the official statement it is said that these advisers will be available to assist the departmental organisations of scientific research and technical development. They will not supersede the departmental organisations, which will, for instance, continue to be responsible for the examination of new inventions and technical suggestions in their own fields. They will be responsible to the Minister of Production, but will work under the immediate supervision of the Lord Privy Seal, acting on his behalf.

Fuel Economy—400 Years Ago

DR. JOHN READ, Professor of Chemistry in the University of St. Andrews, whose book on explosives we reviewed last week, has unearthed, from the autobiography of a sixteenth-century alchemist and astrologer, a description of the practice of a certain Mr. Mintorne who, in the astrologer's words, "seldom or never kepte any fier in his house, but he had some lode of faggots lying in a house, and alwais when he was a-cold, he wold goe and carry his faggots up into a lofte till he was hote; and when he had carried them all up, he wold fetch them downe again and burn none . . . saying it was better to heat himself soe than to syt by the fier." A model of what the Minister of Fuel would like to see as the modern counterpart of Mr. Mintorne formed part of the Fuel Economy Exhibition at Harrods—a young woman performing physical jerks before breakfast in order to render herself immune from the temptation to turn on external heat. The Minister's method is an improvement on Mr. Mintorne's in so far as it dispenses with the necessity of acquiring a stock of faggots—not an easy task these days.

The "Big Stick" for Fuel Wastage

IN view of the critical position of the coal output, which has been variously described in the daily Press as "unsatisfactory" and as "desperate," it is not to be wondered at that Mr. Raymond Evershed, K.C., Regional Fuel and Power Controller in the East Midlands, should have informed industrialists at Nottingham this week that defaulters who would not co-operate with him in the saving of fuel in factories would be dealt with by the method of the "big stick." It is to be hoped that his words are not a mere empty threat; too often the neglect of certain lazy individuals has led to serious loss to a whole community. If one factory in an industrial area is extravagant with its fuel, it is easy to see that the whole district will suffer, and industrialists for their own good should work in with the controllers to see that there are no backsliders. One point that Mr. Evershed made is especially interesting, namely, that he would insist on *individual* members of every staff being responsible for securing economy. If possible, fuel economy must become a habit, just as safety precautions are by way of becoming second nature in well-run plants. Economy wardens and anti-extravagance posters, we suggest, might well be instituted as an initial step.

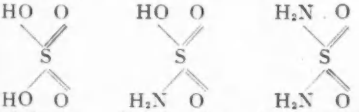
More than 10,000 drawings have to be made before a new bomber can fly. This is one of the many uses to which waste paper is put in aircraft factories.

Sulphamic Acid*

A Review of its Industrial Possibilities

FOR many years sulphamic acid was known as an obscure laboratory chemical which possessed some rather unusual properties of interest only to scientific investigators. Considerable fundamental information concerning its physical and chemical properties was therefore already available when a new and practical process for its manufacture was discovered (Cupery, *Ind. Eng. Chem.*, 1938, *30*, 627). During the four years which have followed the announcement of this new process, the commercialisation of sulphamic acid has rapidly expanded, and to-day this former curiosity is being produced on a commercial scale.

Audrieth and his students published in 1940 an excellent review of the chemistry of sulphamic acid and related aquo-ammonosulphuric acids, in accordance with which the chemical structure of sulphamic acid as the half-amide of sulphuric acid is brought out. Replacement of both hydroxyl groups of sulphuric acid with amide groups yields sulphamide. Sulphonation of sulphamic acid yields imidodisulphonic acid.



The more important properties on which, in most instances, the industrial uses of sulphamic acid are based are as follows. It is a solid melting at 205° C.; it is colourless, odourless, non-volatile, non-hygroscopic, soluble in water and in formamide, and slightly soluble in methanol. Sulphamic acid is highly ionised in aqueous solution, and its *p*H range approaches that of nitric, sulphuric, and hydrochloric acids. It forms highly soluble salts with (a) basic hydroxides—*e.g.*, lead and barium sulphamate—and with (b) amines and polymeric amines. Sulphamic acid contains a reactive amide group, is hydrolysed by hot water and alcohols, and reacts with nitrous acid and nitric acid, with aldehydes, and with certain amide groups. It should be emphasised that sulphamic acid shows a unique and important combination of properties in that it is a solid, non-hygroscopic material which is easily packaged and transported commercially, and is also a strong acid which is highly ionised in aqueous solution.

Very little information relating to the physiological properties of sulphamic acid has been published. In a preliminary study made by the Haskell Laboratory of Industrial Toxicology, it was found that rather large oral doses of sulphamic acid to rats showed toxic effects such as might be expected from feeding any highly ionised acid material. Upon brief contact with the skin sulphamic acid shows no noticeable effect but, as a precaution, it is recommended that prolonged exposures be avoided. In 200 human test cases supervised by the Haskell Laboratory, fabric treated with ammonium sulphamate produced no skin irritation.

Reaction with Nitrous Acid

One of the first industrial applications to be developed for sulphamic acid was based on its reaction with nitrous acid. The chemistry of this application is represented by the equation: $HO.SO_2.NH_2 + HNO_2 \rightarrow H_2O + N_2 + H_2SO_4$. This reaction is exceedingly rapid and proceeds quantitatively, as shown a number of years ago by Baumgarten and Marggraff, who recommended the use of sulphamic acid in an improved analytical procedure for the determination of nitrites. Recently this treatment for nitrite removal has been utilised in analytical procedures for determining dissolved oxygen and biochemical oxygen demand in sewage treatment and river pollution studies.

Of more direct commercial interest is the use of sulphamic acid for eliminating the excess nitrite employed in diazotisation reactions for dye and pigment manufacture. In a representative pigment manufacturing process which originally required 25 lb. of urea and a period of 3 hours to complete the excess nitrite removal, 4 lb. of sulphamic acid now complete the same reaction in about five

*From an article by M. E. Cupery and W. E. Gordon, E.I. du Pont de Nemours and Co., Inc., in *Ind. Eng. Chem.*, 1942, **34**, 7, pp. 792-7.

minutes. Similar results are obtained in azo dye manufacture. In such procedures a larger excess of nitrite may frequently be employed to facilitate the diazotisation. Because the reaction may be more closely controlled, cleaner shades of colour with better uniformity in batches are possible. The advantages of these procedures are now being extended to other fields such as in the application of developed colours to textiles and leather.

Flameproofing

An early observation that the sulphamates are highly compatible with cellulose led to their extensive evaluation as flameproofing agents. Ammonium sulphamate is unique among ordinary fire retardants because it does not cause stiffening or otherwise adversely affect the feel of fabrics, paper, and the like. Moreover, the sulphamates show no tendency to crystallise on the surface of the flameproofed article on ageing. Clothing treated with ammonium sulphamate retains its original appearance and texture and in practical uses, such as workmen's overalls, has shown no decrease in wearing quality. Flameproofed draperies which are often exposed to wide variations in temperature and humidity show no efflorescence of the sulphamate. Under certain special conditions where a slight afterglow cannot be tolerated or where exceptionally high humidities are encountered, modified compositions of ammonium sulphamate are recommended. The applications are made from aqueous solutions by either dipping or spraying methods. The treatment is resistant to dry-cleaning solvents but is rapidly removed by water. Appreciable quantities of this fire retardant are now being utilised in aircraft manufacture and in flameproofing workmen's clothing for greater protection—for example, in steel mills, shipbuilding plants, and welding operations.

Laboratory Reagent

Another general application for sulphamic acid is as a laboratory reagent in both industrial and institutional laboratories. A number of such possible uses follow: titrimetric standard (indicator *p*H range 4.5-9); diazotisation reactions (dye preparations); analytical procedures for nitrite analysis and oxygen in water analysis; extraction of rare earth metals; miscellaneous experimental uses, such as preparing nitrous oxide from nitric acid and sulphamic acid, and determining water of hydration in calcium sulphamate.

Audrieth and his students showed that sulphamic acid is an excellent acidimetric reference standard in analytical chemistry, and is superior to such standards as benzoic acid, succinic acid, potassium biiodate, and potassium acid phthalate. The analytical procedures listed above have shown definite advantages and are recommended as standard methods of analysis. It is reported that the separation of the lanthanum earth metals from the yttrium rare earth group is facilitated through the use of sulphamic acid. In a recent publication King and Hooper showed that hydrated calcium sulphamate is readily dehydrated at temperatures above 69.4° C. As the hydrated salt is easily prepared in the laboratory, it should be especially suitable for determinations of water of hydration as carried out in elementary chemistry courses. The preparation of nitrous oxide gas is easily accomplished simply by heating nitric acid with sulphamic acid.

Tanning

An extensive programme relating to the use of sulphamic acid in the tanning industry has been carried out, and certain advantages have been observed. Skins processed with sulphamic acid have a finer and silkier grain than those prepared with sulphuric acid. Moreover, sulphamic acid gives a tighter skin and produces better suède when used on goatskin tanned with formaldehyde. The calcium sulphamate formed in the processing is highly soluble, so that there is less tendency toward lime spots than when sulphuric acid is used.

In the leather pickling operation in which hides are converted from an alkaline to an acid condition for prolonged preservation, a portion or all of the sulphuric acid may be replaced by sulphamic acid, according to the results desired. Higher proportions of sulphamic acid yield leather showing a more attractive grain and better working qualities.

In the regular bating procedure the hides are subjected to the action of enzymes to remove hair follicles and extraneous matter. In this operation approximately 0.25 per cent. of sulphamic acid, based on the flesh weight of hides, and the regular amount of bating

material or similar products are added to the skins placed in the bating paddle. The temperature should be allowed to rise to the normal point in the tannery (32°-35° C.). If the bating material contains no ammonium salts, it is desirable to add a small amount of ammonium chloride or sulphate to the bate, to prevent surface hardness. The leather produced with sulphamic acid according to the above procedure shows a fine and silky grain which is retained throughout the subsequent finishing operation.

Weed Killer

About five years ago the examination of sulphamic acid and its salts as weed killers was first initiated. Preliminary reports of this work, published about two years ago stimulated a large number of practical field tests by agents scattered throughout this country and abroad. Highly favourable results with ammonium sulphamate are indicated in the reports of practically all these investigations. Ammonium sulphamate is quite rapidly decomposed by bacteria in the soil so that it may be applied without danger of long-time soil sterilisation. It does not possess the fire hazard associated with certain weed killers, and it may be used advantageously in places where plants are subsequently grown, where toxic materials would be objectionable, or where fire hazards should be avoided. A discussion of the chemistry of the action of ammonium sulphamate as a herbicide would be highly speculative. It is possible that its slight acidity and high solubility combined with its compatibility with cellulose may be important factors, but there is no evidence to prove this.

Interesting among the derivatives of the sulphamates are the aldehyde addition products; their structure is represented by the general formula R—CHOH—$NHSO_3M$, or the dehydrated form R—CH=NSO_3M, where R designates hydrogen or an organic group and M represents a cation metal or group. The aldehyde derivatives of calcium sulphamate are of particular interest because of their greater stability, especially in the isolated, solid form. Depending on the conditions of preparation, either the calcium methylol sulphamate, $(HOCH_2NHSO_3)_2Ca$, or the calcium methylene sulphamate $(CH_2=NSO_3)_2Ca$, may be prepared. As would be expected, the methylol derivative is highly soluble in water, while the methylene derivative is only moderately soluble. Other aldehyde-addition products, such as calcium benzaldehyde sulphamate and calcium furfural sulphamate, are readily prepared.

Electroplating

Recent publications have indicated that sulphamic acid acts satisfactorily under certain conditions when used for electroplating metals or for refining metals by electro-chemical procedures. Copper, silver, iron, nickel, cobalt, cadmium, zinc, and lead have been satisfactorily plated in smooth deposits from sulphamic acid solutions. Certain advantages over fluosilicic acid have also been noted in the refining of lead. Sulphamic acid is more easily handled commercially and its solutions may be used in ceramic- or asphalt-coated wood containers. However, further practical testing is required before it can be extensively used thus.

Miscellaneous Uses

A considerable number of miscellaneous applications for sulphamic acid and its salts have been disclosed in the recent patent literature. Among the applications of the acid itself are: laundry sour, washing rinse or fixing agent for textile dyes, gas-liberating compositions, metal-polishing compositions, photographic fixing baths, photographic bleaching baths, solubilising high-molecular-weight amines (basic dyes), solubilising polymeric amines, peptising pigments, polymerising olefines, and acidifying oil wells. The sulphamates may be utilised as antigelation agents for soap solutions, in preparing phthalocyanine pigments, in preparing guanidine sulphamate, and as textile finishing agents.

Ammonium sulphamate is known to decrease the gelation tendency of soap solutions. This antigelation effect of the sulphamate ion has been noted in other colloidal systems and may well find specific industrial applications.

In summarising the present commercial position of sulphamic acid, it may be stated that a number of established industrial applications have already been made which permit its manufacture on an industrial scale. Additional practical application will no doubt be found. Sulphamic acid can now be considered an available, commercial chemical destined to become of increasing industrial importance.

Canada's Record Chemical Output

Extensive New Plant in Operation

[*Photo—Public Information*

Specialised courses in industrial chemistry are sponsored by by the industry. These girls will go straight from the course into a job.

PROGRESS made by the chemical industry in the Dominions is among the outstanding developments of this war. Great plants are being erected to increase the output of chemicals already being produced, while new sections are being formed at the cost of millions of pounds. In THE CHEMICAL AGE of August 15, 1942, we gave a pictorial view of the progress of Australia's chemical industry and we are now able to show, in like manner, some of the important work being done by Canada. According to preliminary figures of the Dominion Bureau of Statistics the production of chemicals and allied products in Canada reached a record total value of £53,700,000 in 1941 as compared with £38,780,000 in 1940. Under the impetus of war demands, new plants came into operation, new products appeared, pay rolls increased sharply and operations in general were stepped up to a level far above that previously attained. Each of the thirteen industries in this group reported a greater output value than in the previous year, but the gains were principally in heavy chemicals and in the miscellaneous industry which includes explosives and shell-filling, the former increasing 59 per cent. and the latter 79 per cent. Gains in the other industries were as follows: hardwood distillation, 83 per cent.; compressed gases, 28 per cent.; paints 27 per cent; medicinals 24 per cent.; polishes, 23 per cent.; adhesives, 23 per cent.; soaps, 23 per cent.; inks, 21 per cent.; toilet preparations 21 per cent.; and coal-tar distillation, 3.5 per cent. For fertilisers the output value was about the same as in the preceding year.

[*Photo—Public Information*

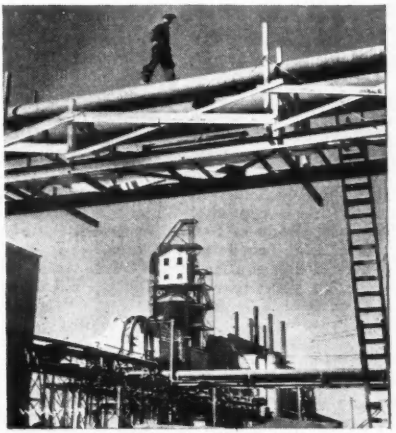
A new industry for Canada is the preparation of glass for optical instruments. An operative is here shown peeling off the upper crust of a melting-pot.

Altogether there were 803 establishments

in operation, representing an investment of £63,000,000 and giving employment to an average of 45,968 workers during each month of the year. These firms paid out £12,000,000 in salaries and wages, £24,000,000 for materials for processing, and £1,600,000 for fuel and electricity. The increase in capital compared with 1940 was 48 per cent., in employment 66 per cent., in salaries and wages 61 per cent., and in cost of materials 47 per cent. About 54 per cent. of the production in 1941 was from Ontario with 429 establishments and output valued at £29,000,000. Quebec, with 252 factories and production worth £18,880,000, accounted for 35 per cent., and British Columbia with 44 plants and output at £2,640,000 accounted for five per cent. of the total.

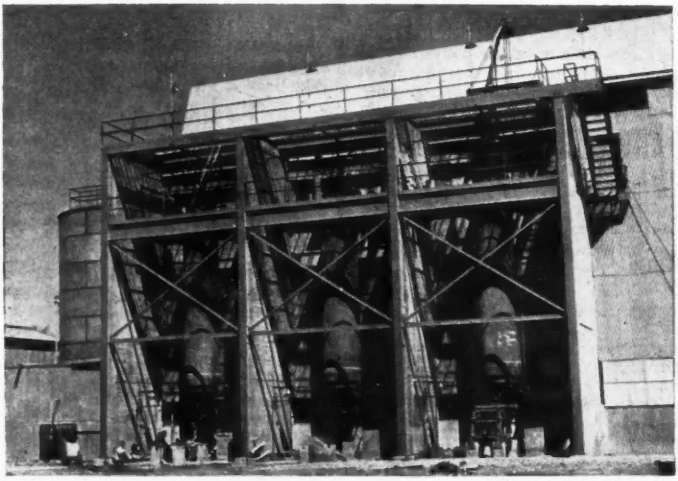
Import and Export Figures

Striking increases were recorded in 1941 for both imports and exports of chemicals and allied products. Imports at £13,080,000 were £2,720,000 higher than in 1940, the principal increases being in acids, miscellaneous inorganic chemicals, dyeing and tanning materials and in paints and pigments. About 82 per cent. of all purchases came from the United States and nearly 14 per cent. from the United Kingdom. It is interesting to note that with regard to value, the imports from the United Kingdom were 20 per cent. greater than in the preceding year, and in fact exceeded those of any other year. The value of exports at £11,740,000 was almost double the corresponding figure for 1940, the principal gains being in the miscellaneous and fertilisers and sodium compounds. There was a threefold increase in the value of shipments to the United Kingdom and a 50 per cent. gain in the sales to the United States.



[Photo—Public Information

Since the start of the war large-scale chemical developments have been brought about in Canada at a cost of millions of pounds to help in the production of munitions of war. Here is part of a large Ontario plant under construction.



[Photo—Public Information

Another view of a large chemical plant in Ontario, which is still under construction.

Personal Notes

DR. V. J. CHAPMAN, Fellow of Gonville and Caius, and Demonstrator of Botany at Cambridge, is the leader of the Cambridge scientific expedition which is making an investigation into the possibility of extracting salts and other chemicals from seaweed.

PROFESSOR R. V. SOUTHWELL, M.A., LL.D., F.R.S., who occupies the Chair of Engineering Science in the University of Oxford, has accepted the invitation of the Governing Body of the Imperial College of Science and Technology, London, to become Rector of the Imperial College, in succession to Sir Henry T. Tizard, K.C.B., M.A., F.R.S.

MR. A. K. MCCOSH has resigned his position as Deputy Controller, Raw Materials, Iron and Steel Control—which he had held since 1939—in order to be free to devote himself to the affairs of the coal trade in Scotland. He will, however, remain at the disposal of the Iron and Steel Control for consultation. In his place MAJOR J. M. CAMPBELL and MR. C. R. WHEELER have been appointed Joint Deputy Controllers, Raw Materials. Major J. M. Campbell has been succeeded as Director for Foreign Ore by MR. D. H. KYLE.

Obituary

DR. HENRY G. KNIGHT, who died on July 13 at Washington, D.C., was a chemist particularly distinguished in agricultural and soil chemistry. Since 1927 he had been head of the U.S. Government department now known as the Bureau of Agricultural Chemistry and Engineering.

MR. ARTHUR HARPHAM, whose death at the age of 92 is reported, was for 65 years an active member of the firm of Edward Joy & Sons, Ltd., oil manufacturers, Leeds. He was a founder of the Leeds Operatic and Dramatic Society, and was at one time an enthusiastic cricketer.

MR. FREDERIC SAMUEL KERNICK, director of Kernick & Sons, Cardiff, and a past-president of the South Wales branch of the Society of Chemical Industry, has died. Mr. Kernick, who was 56 years of age, was only recently elected president of the Cardiff Chamber of Trade.

MR. CHARLES ALGERNON MOREING, who died at Esher on September 5, aged 86, was a distinguished civil engineer and a partner in the firm of Bewick, Moreing & Co. He was especially interested in the mining of zinc and lead, notably in Burma and Australia, and was largely responsible for the formation of the Zinc Corporation, Ltd., which led to the development on a commercial scale of the differential flotation of lead and zinc—a revolution in base-metal metallurgy.

MR. WALTER DENTON, who died recently in Harrogate at the age of 56, was a director and for some years secretary of Brotherton and Company, Ltd., chemical manufacturers, of Leeds. He was closely associated with the late Lord Brotherton, founder of the firm. Mr. Denton was director of many companies connected with the chemical industry including the British Aniline Company, Ltd.; Hosiery Dyers, Ltd.; Shettleston Oil and Chemical Company, Ltd.; Yorkshire Dyeware and Chemical Company, Ltd.; and Yorkshire Tar Distillers, Ltd.

New Control Orders

Mercury

The Ministry of Supply has issued the Control of Mercury (No. 10) Order, 1942, which substitutes a new schedule of maximum prices of certain compounds for that in the Control of Mercury (No. 5) Order, 1941. Copies of the new Order, which came into force on September 8, 1942, may be purchased from H.M. Stationery Office, or through any bookseller, price 1d. (S. R. & O. 1942, No. 1813).

Lactic Casein

Under another order issued by the Ministry of Supply, the disposal of lactic casein is now subject to licence procedure. Anyone wishing to purchase lactic casein must do so only from a licensed vendor. The order does not apply to rennet casein. The order which came into operation on September 7, is the Control of Casein (No. 1) Order, 1942, and copies can be obtained (price 1d.) from H.M. Stationery Office, or through any bookseller (S. R. & O. 1942, No. 1767).

Tin Ores and Concentrates

With effect from September 14 the Board of Trade has revoked the open general licence permitting the importation without separate licence of tin ores, concentrates and residues. On and after that date separate licences will be required, except in the case of goods despatched to the United Kingdom before September 14, and imported into the United Kingdom before November 14, 1942.

Saccharin

Article 2 of the Saccharin (Control and Maximum Prices) Order, 1941, has been amended from August 31, 1942, so as to exempt from the licensing provisions of that article the manufacture for sale of saccharin and dulcin solutions intended solely for use in pharmaceutical preparations (S. R. & O. 1942, No. 1773).

Raffination of Benzene

Advantages of New Methods

IN the raffination of crude benzene, the previous process employing concentrated sulphuric acid at 66° Bé. has been partly abandoned in favour of a selective elimination of diolefins, etc., by use of sulphuric acid of about 60° Bé. or by heating with alkali of benzene washed in diluted acid, according to the *American Chemical and Engineering News*. This method, says the writer, has the advantage of leaving valuable olefins and unsaturated hydrocarbons in the motor benzene and reducing the loss by washing from 10 or 15 per cent. to 5 per cent. The disadvantage is that after prolonged storage the benzene yellows and precipitates resins. To overcome this drawback, the crude benzene is separated by distillation into two fractions, below 135° C. distillation point, and 135° to 180° C. The first one only is treated with sulphuric acid of 60° Bé. at 25° to 40° C., while the second fraction is washed with 66° Bé. After neutralisation the two fractions are mixed and, although the total loss is only 6 per cent., the content of resinous material is below 1 gram per 10,000 cc.

Separation of crude benzene into two fractions to be treated by different processes is also the solution for production of a motor fuel with a sufficiently high anti-knock value from the kerosene fraction of mineral oils. If the latter is blended with benzene, an inclination towards knocking persists because the mixture is highly volatile and of varied composition. It was found to be unsuitable for certain engines. However, the crude benzene can be separated into two fractions, distilling below and above 160° C. The former is refined with sulphuric acid; the latter is subjected to pressure hydrogenation in such a way that impurities (sulphur and oxygen compounds) are eliminated and the other contents are left unaffected. Restriction of pressure hydrogenation to one fraction is said to ensure without great loss in quantity a high yield especially of hydrocarbons distilling at higher temperatures.

MR. GORDON ROBBINS, Chairman of Benn Brothers, Limited, proprietors of THE CHEMICAL AGE, was unanimously re-elected President of the Institute of Journalists at the Annual Meeting in London on September 5. In his Presidential address Mr. Robbins declared that there were four points on which the Institute could not compromise after war. There must be no more paper, metal, and man-power controls; no more censorship, and an end of the Ministry of Information; no more official favouritism for the B.B.C., and no more prosecutions of newspapers unless in accordance with the ordinary process of law.

Vegetable Oil Research

Rubber-Like Material Tested

THE Northern Regional Research Laboratory in Illinois, it is reported, has been able to produce materials from soya bean oil and maize oil that "look, smell and feel much like natural rubber." Some of these products, it is stated, will stretch 200 per cent. or more and return to their original forms, and show tensile strengths of approximately 500 lb./sq. in. Natural rubber has a stretch of 600 per cent. and a tensile strength of at least 3000 lb./sq. in. Nevertheless, it is considered not impossible to find uses for a substitute that is only a fraction as strong and elastic. There are other important qualities than stretch and tensile strength, their importance depending on the intended use. Some of these qualities, it is pointed out, are resistance to abrasion, cracking, oxidisation, heat, and the effects of light and chemicals. Most of the work, so far, has been confined to the laboratory, but some of the material is being tested on a pilot plant; if this proves satisfactory commercial trials would follow. The efforts of American chemists to meet the rubber shortage have so far been centred mainly on producing a synthetic product from such large-scale materials as grain and petroleum; the researches now quoted might be useful in industrial operations that have less enormous and exacting requirements than tyre manufacture.

Water Paint

New British Standard

THE British Standards Institution has just issued a War Emergency Standard for Water Paints and Distempers for interior use (B.S. 1053). These materials have been classified under the following headings: Type 1, oil bound water paint, Grade 1 and Grade 2; type 2, washable distempers—oil free; type 3, non-washable distempers—oil free. The specification provides for these types in white and tints characterised by their response to performance tests together with certain requirements relating to chemical composition. The foreword gives notes on the nature and general properties of the materials for the guidance of users and the specification itself covers consistency, colour and finish, water content, oil or varnish content, coarse particles, brightness, resistance to dry rotting and "striking," and keeping properties, and gives appendices for testing for these conditions. Copies may be obtained from the Institution, 28 Victoria Stree, Westminster, S.W.1, price 2s. 3d. post free.

Weekly Prices of British Chemical Products

TRADING conditions for industrial chemicals have been fairly active during the past week with a good volume of business spread over most sections of the market, and values generally continuing steady. Delivery specifications under existing contracts are reported to be satisfactory. In the soda products section fresh inquiry is reported for bichromate of soda, while there is a continued scarcity of supplies of chlorate of soda and yellow prussiate of soda. Glauber salt and salt cake are an active market. The chief feature of the potash section is the tightness of supplies, and prices for yellow prussiate of potash remain nominal. In other directions a steady inquiry is reported for British-made formaldehyde, and other materials in good demand are glycerine, acetone, and arsenic. In the coal-tar products market cresylic acid and carbolic acid crystals are in steady demand, while no change is reported in the position of pitch which is receiving a fair inquiry. Xylol remains quiet.

MANCHESTER.—Although there has been again little change of any consequence in chemical prices on the Manchester market during the past week the general tendency is strong and future movements in all sections are likely to be upward rather than downward. Current inquiry is on a fair scale, though in a number of instances nothing like prompt delivery is obtainable. Potash materials generally are in short supply and offers are readily absorbed, while a steady trade is passing locally in sulphuric and hydrochloric acids and also in the soda and ammonia products.

GLASGOW.—The position in the Scottish heavy chemical trade is unaltered from last week. Home business still maintains its steady trade and export business is rather limited. Prices generally remain very firm.

Price Changes

Rises: Formaldehyde (Manchester); Salt Cake (Manchester); Sodium Hyposulphite, commercial; Sodium Sulphide, crystals; Vegetable Lamp Black.

Falls: Chrometan; Naphtha (Manchester); Sodium Hyposulphite, photographic; Sodium Sulphide, solid; Turpentine.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./ 1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £14 10s. per ton, f.o.b.

Aluminium Sulphate.—£10 5s. to £11 5s. per ton d/d.

Ammonia Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£37 10s. per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—For 1-ton lots, £41 to £46 per ton, according to quality, ex store; for 20-ton lots; £35 to £40 per ton d/d. Intermediate prices for intervening quantities.

Barium Chloride.—98/100%, prime white crystals, £16 10s. to £19 10s. per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £31 10s.; crystals, £32 10s.; powdered, £33; extra fine powder, £34; B.P. crystals £40 10s.; powdered, £41; extra fine, £42 per ton for ton-lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £83; powder, £84 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £52 15s.; crystals, £53 15s.; powdered, £54 15s.; extra fine powder, £56 15s.; B.P. crystals, £61 15s.; powdered, £62 15s.; extra fine powdered, £64 15s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—1s. 5½d. per lb., normal; imported material, 1s. 10d. per lb. MANCHESTER: 1s. 8d. per lb.

Copper Oxide.—Black, £95 per ton.

Copper Sulphate.—About £31 per ton f.o.b. MANCHESTER: £31, less 2%, in 5-cwt. casks f.o.b. Liverpool.

Cream of Tartar.—100%, £18 12s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£24 5s. to £25 10s. per ton d/d. MANCHESTER: 40%, £24 10s. to £26 10s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity in drums, £3 12s. 6d. to £4 6s. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 5½d. to 8s. 11d. per carboy d/d according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £40 10s. per ton. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, 51s. to 54s. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £45 per ton; 10 cwt. to 1 ton, £44 15s.; 1/2 tons, £44 10s.; 2/5 tons, £44; 5/20 tons, £43 10s.; 20/100 tons, £43; over 100 tons, £42 10s. per ton, less 2½%, carriage paid, non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £55 10s.; 5/15 tons, £51 10s.; 15/25 tons, £51; 25/50 tons, £50 10s.; 50/200 tons, £50 per ton, less 5 per cent. carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £67; 5/10 cwt., £66; 10 cwt. to 1 ton, £65 10s.; 1/2 tons, £64; 2/5 tons, £63; 5/10 tons, £61; 10/15 tons, £60; 15/25 tons, £59; 50/100 tons, £58 10s. per ton, less 5% carriage paid.

Litharge.—1 to 2 tons, £44 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £14 to £18 per ton. MANCHESTER: £14 to £16 per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 11s. 7d.; bichloride lump, 12s. 2d.; ammon. chloride powder, 13s. 5d.; ammon. chloride lump, 14s.; mercurous chloride, 13s. 9d.; mercury oxide, red cryst., B.P., 15s.; red levig. B.P. 15s. 6d.; yellow levig. B.P. 14s. 9d.; yellow red, 14s. 4d.; sulphide, red, 12s. 11d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £55 7s. 6d. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement. Liquid, d/d, £26, in lots of 1 to 10 tons, under 1 ton, £27 10s., ex store.

Potassium Bichromate.—Crystals and granular, 7½d. per lb.: ground, 8½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £55 5s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, £40 to £45 per ton ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Supplies scarce, prices nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic.—Solid 76/77%; spot, £15 7s. 6d. per ton d/d station.

Sodium, Acetate.—£40 per ton, ex wharf.

Sodium Bicarbonate (refined).—Spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 5¾d. per lb., anhydrous, 6d. per lb., net d/d U.K.

Sodium Bisulphite Powder.—60/62%, £17 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £20 per ton for 2-ton lots; commercial, £15 per ton; photographic, £22 per ton.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 6d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£16 per ton, d/d U.K. in 1-ton lots.

Sodium Nitrate.—Refined, £15 5s. per ton for 6-ton lots d/d.

Sodium Nitrite.—£21 to £23 per ton for ton lots.

Sodium Percarbonate.—21½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £23 to £28 per ton d/d for ton lots. Tri-sodium, £26 to £30 per ton d/d for ton lots.

Sodium Prussiate.—7¾d. to 8½d. per lb. ex store.

Sodium Silicate.—£9 10s. to £10 12s. 6d. per ton, for 4-ton lots.

Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide.—Solid 60/62%. Spot, £16 10s. per ton d/d in drums; crystals, 30/32%, £12 10s. per ton d/d in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, spot. £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—For quantities not less than 4 tons, unground, unsieved and ungraded, £14 5s. per ton, ex store. Ground and sieved, £15 to £16 10s. per ton, ex store, according to mesh. Controlled prices.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—4s. 4d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 4s. 4d. per lb.

Tin Oxide.—Snow white, 305s. per cwt.

Zinc Oxide.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Bisulphide.—£34 per ton, according to quality, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes. White, 6 3/16d. to 10½d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.
Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B. See Concentrated Fertilisers.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, August, £9 10s.; increased charge of 1s. 6d. per month up to March, 1943.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton in 6-ton lots d/d farmer's nearest station, in August: I.C.I. Type, "Special III," £14 9s. 6d.; Type "B," £14 1s. 3d.; Type "C," £17 19s. Increased charge of 1s. 6d. per month up to March, 1943.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Crude, 60's, 1s. 10d.; pure 2s. 6d., per gal., ex works.

Carbolic Acid.—Crystals, 10d. to 11d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 9¾d. to 11¼d. per lb., d/d; crude, 4s. to 4s. 6d., naked, at works.

Creosote.—Home trade, 6½d. per gal., f.o.r., maker's works; exports, 6d. to 6¼d. per gal., according to grade. MANCHESTER: 6½d. to 9d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 6d. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 2d. to 2s. 6d. per gal.; heavy, 90/190°, 1s. 10d., naked at works. MANCHESTER: 90/160°, 2s. to 2s. 3d. per gal.

Naphthalene.—Crude, in 4-ton lots, in sellers' bags, £6 6s. 8d. to £9 7s. 7d. per ton, according to m.p. In sellers' bags, 2s. ton lots; hot-pressed, £11 3s. to £11 8s. per ton; purified crystals, £19 to £35 per ton. Controlled prices.

Pitch.—Medium, soft, 45s. to 55s. per ton, f.o.b. MANCHESTER: 45s. per ton at works.

Pyridine.—90/140°, 18s. per gal.; 90/160°, 13s. to 14s. MANCHESTER: 14s. to 18s. 6d. per gal.

Toluol.—Pure, 2s. 5d. nominal; 90's, 1s. 10d. per gal. MANCHESTER: Pure, 2s. 5d. per gal. naked.

Xylol.—Commercial, 3s. 1d. to 3s. 5½d. per gal.; pure, 3s. 2½d. to 3s. 7d. MANCHESTER: 2s. 8d. to 3s. 1d.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p **Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—September 9.—For the period ending September 26, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £46 10s. RAPESEED OIL, crude, £48 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £43 10s.; refined deodorised, £44 10s. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £35 10s. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £35 10s.; refined hardened deodorised, £39 10s. PALM OIL, refined deodorised, £41 10s.; refined hardened deodorised, £44 10s.; GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £44 10s.; refined hardened, £48 10s.; deodorised, £49 10s. WHALE OIL, crude, hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £37 10s. ACID OILS—Groundnut, £19; soya, £17; coconut and palm kernel £22 10s. ROSIN, 26s. 6d. to 33s. per cwt., ex wharf, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

General News From Week to Week

The telegraphic address of the Wrought Light Alloys Development Association has been changed from "Wroughtal" to "Lightaldev, Birmingham."

The use of phosphates on grassland, including rotation grass, is prohibited from September 9. It is hoped that supplies will be available for arable crops during the winter. County war executive committees can permit phosphates to be used on particular types of grassland, where their use is essential.

When Parliament reassembles, Major A. N. Braithwaite, M.P. for Buckrose, intends to table a motion that the House, while appreciating the effort of the United States to supply Britain with synthetic rubber, realises the vital necessity for establishing the industry in this country at the earliest possible moment.

The appointment of three full-time scientific advisers to the Ministry of Production as announced recently, is welcomed, but many M.P.'s regret that their activity is apparently to be limited to production and does not include acess to Service Departments and even to the War Cabinet. The motion to establish a whole-time central scientific and technical board to co-ordinate war research and developments is now supported by 126 M.P.'s.

Derbyshire Stone, Ltd., Matlock, have recently purchased from Ben Bennet, Jnr., Ltd., Rotherham, their interests in the Calton Hill Basalt Quarries, together with the plant and fleet of lorries. They have also acquired the share capital of Hardamac, Ltd., the company through which the sales of the products of Calton Hill Quarry are made. The reserves of stone at Calton Hill are large and consist of an exceptionally hard, dark, olivine basalt. The quarry has specialised in the production of bituminised basalt.

Foreign News

Production of benzene rose by 15 per cent. in Russia last month and oil output also increased.

A big fire broke out recently in the Panasqueira wolfram mine, near Fundao, in Western Portugal. The mine, the largest in Portugal, and reportedly second largest in the world, is owned by Beralt Tin and Wolfram, Ltd.

The American Chemical Society has announced the discovery of a new source of vanadium says Reuter, which should make the United States largely independent of foreign imports. More than half of these at present come from South America.

The Argentine Minister of War has announced the proposal to form a combination, representing both State enterprise and private capital, to develop the production of zinc, aluminium, and special steel. It is proposed to set up the requisite plant at Rio Tercero in the province of Cordoba.

The first official groundnut estimate places the acreage over all India at 2,800,000, including Baroda State for the first time. Condition of the crop is good as a whole, states Reuter. Without Baroda, there is an increase of 2 per cent. over last year's estimate.

The president of the Chilean Nitrate Sales Corporation is reported to have said that 700,000 tons of Chilean Nitrate reached the U.S.A. in the year ended June 30, 1942. In spite of shipping difficulties it was hoped to repeat this in the next twelve months.

Even old bridges and railways will have to be scrapped to meet the demand for metal in the U.S.A., it is stated. An American industrialist says that there is only two weeks' supply of steel scrap in the country in the hands of the steel mills.

The possibility of further chemical industries for Mysore are indicated in a report from India. Sulphuric acid and ammonium sulphate are being made in the State on a substantial scale, whilst the additional items are likely to include calcium carbide, refractories and abrasives.

The S.-A. Fabricacion de Anilinas y Productos Quimicos has been authorised to build a dyestuffs factory in Barcelona, and will begin production before the end of the year, says a U.S. report. Exports of finished products will be used to pay for imported raw materials.

Hydrogen fluoride is a quicker catalyst for polymerising butadiene than the widely used aluminium chloride, according to Dr. J. H. Simons, of Pennsylvania State College, who also states that it will enable a refinery to produce 100-octane petrol, while saving aluminium, chlorine, and other valuable materials.

A new award for achievement in the plastics industry is the John Wesley Hyatt Medal, a gold medal which, with $1000 in cash will be presented annually by the Hercules Powder Company to "the individual who makes the most significant achievement in the plastics industry each year." The medal is designed by Paul Manship and commemorates J. W. Hyatt, who first applied nitrocellulose to plastic uses. The award will be administered by a committee of leading American scientists.

To conserve supplies of nickel for war purposes, Canada has decided to manufacture 5-cent pieces, which have so far been made of nickel, out of copper and zinc with the addition of an alloy called tombac. The new 5-cent coins, which will be placed in circulation this month, will be twelve-sided.

Vast lignite deposits 175 miles north of Cochrane in Northern Ontario, are to be developed by the Provincial Government, says Mr. Hepburn, Premier of Ontario. Some 100 million tons are already blocked out, and 8½ million are easily accessible. The high moisture content of the lignite necessitated the erection of a processing plant to reduce the bulk.

An increase of 502,000 tons of bauxite has been produced from the mines in Dutch Guiana in 1941, as compared with 1940. The mines were taken over by an American firm and a Dutch East Indies firm last December, and the working of them has now been declared a war industry. The United States now obtains 60 per cent. of its bauxite from Dutch Guiana.

The erection of a new plant for the manufacture of synthetic fuel oil is said to be proceeding apace in Tuscany, where lignite deposits provide raw material at hand. The semi-state company, Società Italiana Carburanti Sintetici, recently raised its capital to nearly 61 million lire, but the usual difficulty about obtaining machinery from German makers seems to be cropping up.

An important stage in the development of India's mineral resources is marked by the creation of a "utilisation branch" of the Geological Survey of India. The new branch will link up the discoveries of the Geological Survey proper with their possible commercial development; it will undertake not only small-scale mining operations, but also the construction and working of experimental and pilot plants for smelting, etc.

The Sulphite-Lye Association (Vereinigung Sulphitablauge) has been founded in Germany for the purpose of combining all cellulose works which apply the sulphite process, and to watch over the "production and utilisation of the remaining lye." The lye will be used for the manufacture of adhesive and dressing products, for cementing, as fillings for plastics, sand bindings for chill casting moulds, and for insecticides and fuels.

For the production of caoutchouc and guttapercha in Eastern Europe, Ost-Gesellschaft für Pflanzenkautschuk und Guttapercha m.b.H. has been formed in Berlin with a small capital. The company is to act as agent for the German authorities and to collect and process vegetable caoutchouc and guttapercha in the occupied eastern territories. It is thought that the company will encourage the cultivation of rubber-yielding plants like dandelion, etc.

Swedish farmers, it appears, are likely to be disappointed in the allotment of fertilisers for the coming season. The delivery of 80 per cent. of phosphatic fertiliser and 85 per cent. of nitrate of lime (based on normal purchases), which was promised by the Food Commission last November, may not be possible; and the unrestricted delivery of cyanamide and ammonium sulphate is also faced with considerable difficulties.

Union Resinera S.A., the Spanish resin producer, has acquired new pine forests and intends to build a new factory in the region of the Sierra de Cazorla. It also intends to extend its plant facilities for the treatment of by-products and to produce celluloid by the St. Gobain patents. The entire output of resin and turpentine oil will be used in the home market. The company's capital has been raised from 75 to 125 mill. pesetas.

National emergency steel specifications, announced by the U.S. War Production Board, cover a number of low-alloy steels suggested as alternatives for standard alloy steels. Wherever possible carbon steel and intermediate manganese-molybdenum steel are to be used, while steels containing strategic elements, such as nickel, chromium, tungsten, cobalt, and vanadium are restricted. Furnace treatment, if necessary, for special core properties, and then oxy-acetylene flame-hardening to produce the desired surface condition, can be applied to the emergency steels; and the hardening effect can be restricted to only those surfaces where it is needed, and the degree and depth of hardness can be accurately controlled.

Forthcoming Events

There will be a meeting of the London and South-Eastern Section of the **Institute of Chemistry** at the Institute of Chemistry, Russell Square, on **September 16,** at 4 p.m., when Mr. D. M. Freeland, F.I.C., will deliver an address "Concerning Biscuits."

On **September 22,** at 11 a.m., in the lecture theatre of the Royal Institution, 21 Albemarle Street, London, W. 1, the **Institute of Physics** will hold a discussion on the determination of equilibrium diagrams by X-ray methods. An introductory statement will be made by Sir Lawrence Bragg, F.Inst.P., F.R.S. (president).

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Company Winding-up Voluntarily

PENTOXIDE, LIMITED. (C.W.U.V., 12/9/42.) By special resolution August 22. Friedrich Dispeker, 4 Chivelston, Wimbledon Parkside, London, S.W.19, appointed liquidator.

Order Made on Application for Discharge

ROSS, JAMES WALTER EDWARD, 42 Bushey Way, Park Langley, Beckenham, Kent, hydrological chemist. (O.M.A.D., 12/9/42. Discharge granted subject to judgment for £25.

Company News

Thorncliffe Coal Distillation, Ltd., have declared a final dividend of 25 per cent., making 50 per cent. for the year (same).

Boots Pure Drug Company, Ltd., announce an interim dividend of 10 per cent. on the ordinary shares (same).

International Diatomite, Ltd., record a net profit for the year to March 31 of £600 (loss £779). No dividend is declared (same). Forward, £1040 (£380).

International Bitumen Emulsions, Ltd., have increased their dividend by 2 per cent. to a total of 6 per cent. for the year ended March 31 last.

Savory and Moore, Ltd., announce that dividends on 8 per cent. cumulative preference and 7½ per cent. cumulative preference (participating) for half-year to September 30, 1942, will be paid on that date.

Stewarts and Lloyds, Ltd., have declared interim dividends for the half-year to June 30 last, at 6 per cent. per annum on first preference, 10 per cent. per annum on second preference and 5 per cent. per annum on third preference shares (same).

The United Indigo and Chemical Co., Ltd., announce a net profit, for the year to June 30 last, of £9306 (£11,483) and have declared dividends for the year on ordinary shares of 6¼ per cent (same) and on preference of 6¾ per cent. (same). Forward, £15,991 (£15,591).

New Companies Registered

Superfine Oils and Products Company, Ltd. (375,765.) Private company. Capital £500 in 500 shares of £1 each. Dealers in oil and oil products, engineers (analytical, technical and otherwise), dealers in all requisites for chemical and engineering processes, etc. Directors: W. Hall and Mary N. Hall. Registered office: 5 Verulam Buildings, Grays Inn, W.C.1.

United Anodising, Ltd. (375,663).—Private company. Capital, £10,000 in 10,000 shares of £1 each. To acquire the share capitals (in whole or in part) of Alumite & Alzak, Ltd., the Aluminium Protection Co., Ltd., the Worcester Plating Co., Ltd., British Anodising, Ltd., and the Rainville Engineering Co., Ltd., and any other companies, to carry on the business of an investment and trust company, etc. Subscribers: E. W. Young, L. Wagstaff. Solicitors: Bulcraig & Davis, Amberley House, W.C.2.

Syntorg Chemicals, Ltd. (375,799).—Private company. Capital: £1000 in £1 shares (100 "A," 900 "B"). Manufacturing, consulting and research chemists, makers of chemical products, etc. Subscribers: J. Huggett, 16 Bruton Place, W.1, chartered secretary; and Alfred Kohn, 66 Eton Hall, Eton College Road, N.W.5.

Sinclairs Chemists, Ltd. (375,699).—Private company. Capital: £750 in 750 shares of £1. Wholesale, retail and manufacturing chemists and druggists, chemical engineers, sterilisers, etc. Directors: Edgar W. Borrow, Jas. Matthews. Solicitors: Chas. J. Odhams & Sons, 235 Selhurst Road, S.E.25. Registered office: 6 Hopfield Parade, High Road, Byfleet, Surrey.

Roslin Chemicals, Ltd. (375,660).—Private company. Capital, £100 in 100 shares of £1 each. Wholesale, retail, consulting and analytical chemists, druggists, manufacturers of and dealers in industrial and other preparations, oils, paints, etc. Subscribers: Alice Bennett, Mrs. Amelia F. Osborn. Solicitors: McKenna & Co., 11 Waterloo Place, S.W.1.

Ridings Chemical Products, Ltd. (375,893). Private company. Capital: £1,000 in 1,000 shares of £1 each. Manufacturers of and wholesale and retail dealers in chemical products, industrial and other preparations, oils, paints, dyes, proprietary articles and photographic materials, etc. Subscribers: F. Dawson; W. Driver. Registered office: 63 Great George Street, Leeds, 1.

C. E. Marshall (Wolverhampton), Ltd. (375,510).—Private company. Capital, £500 in 500 shares of £1 each. To acquire the business of an inventor and manufacturer of chemical lighters carried on by Cyril E. Marshall at 27a Queen Street, Wolverhampton, and to carry on the business of manufacturers of and dealers in catalytic compounds, cigarette and gas lighters, car heaters, etc. Directors: C. E. Marshall, Freda E. Marshall, Louisa Marshall, Kathleen M. Flavell, P. D. Sage. Registered office: Birch House, Birch Street, Wolverhampton.

Eliminol Ltd. (375,732).—Private company. Capital; £1000 in 1000 shares of £1. Chemical engineering consultants and metallurgists, manufacturing chemists, manufacturers of compositions for the removal of oil, grease, rust and corrosives from metals, etc. Subscribers: Harold Eves, May Oldham. Solicitors: Harold Eves, 84-86 Chancery Lane, W.C.2.

Chemical and Allied Stocks and Shares

SENTIMENT in the stock and share markets has benefited from the Prime Minister's speech and, following moderate improvement in demand, there was a fairly widespread rise in security values. Various shares of chemical and kindred companies were also aided by favourable market views current in regard to impending dividend announcements. At 33s. 4½d. Imperial Chemical have more than held their recent improvement, there being continued expectations that the interim payment is likely to be maintained. Lever & Unilever were good, having further improved to 31s. on hopes that the forthcoming results may show a better dividend. Triplex Glass fluctuated moderately, but at 34s. 1½d. these 10s. shares were higher on balance, the market having also remained hopeful of a better dividend in this case

United Molasses 6s. 8d. ordinary units were good with a rise on balance from 28s. 6d. to 30s., it being pointed out that on the basis of last year's distribution, comprising a dividend of 20 per cent. and a bonus of 2½ per cent., tax free, the gross yield is still around 5½ per cent. Goodlass Wall 10s. shares were again more active, and have changed hands at slightly over 12s. British Drug Houses transferred at 18s. 9d., and there were again a fair number of dealings in Morgan Crucible issues, the first preference having transferred at 26s. and the second preference between 22s. 6d. and 23s. Awaiting the results, due in October, the units of Wall Paper Manufacturers showed improvement from 27s. 6d. to 28s. Elsewhere, Borax Consolidated deferred remained firm at 32s. 9d., and further improvement from 35s. 9d. to 36s. 3d. was shown by British Match shares.

Business around 36s. 6d. was recorded in Fison Packard, while B. Laporte, remained firmly held and were again quoted at 66s. 3d. British Glues 4s. shares changed hands at 6s. 6d., and Cooper McDougall at 24s. 4½d., while Monsanto Chemicals preference were again 22s. 6d. Hopes that the results, due next month, may show an improved dividend continued to draw attention to Erinoid 5s. shares, which were dealt in up to 11s. 1½d. British Industrial Plastics 2s. shares have changed hands at close on 5s.; Lacrinoid Products and other shares of companies with interests in plastics continued to attract attention. Michael Nairn further improved from 52s. 6d. to 53s. 1½d.; Barry & Staines at 34s. 3d. were well maintained. Amalgamated Metal shares were better at 16s., and, awaiting the interim dividend, Associated Cement remained around 52s. 6d.

Iron and steel issues showed only moderate movements, but Guest & Keen were 26s. 9d.,

Stewarts & Lloyds 48s. 7½d., United Steel 23s. 6d., and Tube Investments 86s., yield considerations having attracted attention in some cases. Allied Ironfounders were firm at 34s. Textile issues were little changed, and Bradford Dyers lost a few pence, awaiting the financial results. In other directions, British Plaster Board were active, but remained at 26s. Firmness was shown by Boots Drug at 36s. 9d., and Beechams Pills were steady at 12s. 6d. awaiting the interim dividend. Imperial Smelting were more active around 11s. 6d., but in other directions, General Refractories at 12s. 7½d. lost a further small part of their recent rise. Pinchin Johnson gained 1s. to 26s. 6d., and International Paint and Indestructible Paint were steady, awaiting the interim dividend announcements. Low Temperature Carbonisation 2s. shares were more active around 1s. 8d. Firmness at 79s. 3d. was shown by the units of the Distillers Co. The latter offer only a moderate yield on the basis of last year's 16¼ per cent. dividend, but this was a conservative payment, and it is realised that there is an exceptionally strong balance-sheet position. British Oxygen were well maintained at 66s. 3d. as were British Aluminium at 45s. Oil shares moved higher, sentiment having been aided by the Anglo-Iranian dividend, which has followed the surprisingly good payment of the Burmah Oil Co.

PHOTOMICROSCOPY FOR PETROLEUM

PHOTOMICROSCOPY—making pictures with a combination camera and microscope—has been employed successfully by U.S. chemists to identify and study the tiny brine droplets and salt crystals in crude petroleum which often interfere with the refining process. Chemical analysis heretofore has been the ordinary method of determining the physical form and behaviour of the various salts in crude oil, but the Bureau's studies now make it possible actually to see the minute impurities which "constitute a major problem in the petroleum industry's refining operations." Designed to supplement chemical analysis and to provide a visual record as an aid in simplifying the industry's refining problems, the new process is described in a technical paper recently published by the U.S. Bureau of Mines.

"Crude petroleum contains impurities such as emulsified salt water and crystalline salt which often interfere in the refining process," investigators commented in explaining the reason for the studies. "The emulsion appears as a mass of tiny droplets which are individually invisible to the naked eye. However, each droplet is surrounded by an oil film. Often the droplets contain microscopic crystals of salt."

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